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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2016/025

LOBSTER (*HOMARUS AMERICANUS*) OFF THE ATLANTIC COAST OF NOVA SCOTIA (LOBSTER FISHING AREAS 27-33): 2016 STOCK STATUS UPDATE

Context

The scientific basis for assessing Lobsters Fishing Areas (LFAs) 27-33 was last examined at a framework meeting in February 2011, followed by an assessment in July 2011 (DFO 2011, Tremblay et al. 2011, Tremblay et al. 2012a). These processes identified three stock units: LFA 27, LFAs 28-32 and LFA 33, and tabled key indicators. Upper stock and limit reference points based on landings were proposed in 2012 (DFO 2012, Tremblay et al. 2012b). Reference points are not currently available for the other indicators and will be explored in the next framework. This Science Response updates key abundance indicators: landings, catch rate of commercial sizes, and catch rate of sublegal sizes from Fishermen and Scientists Research Society (FSRS) recruitment traps to the end of the 2015 fishing season for LFAs 27-32 and 2014-2015 for LFA 33.

This Science Response Report results from the Science Response Process of February 16, 2016, on the Stock Status Update of American Lobster in Lobster Fishing Areas (LFAs) 27-33.

Background

Description of the Fishery

LFAs 27-33 are on the Atlantic coast of Nova Scotia from northern Cape Breton to Shelburne county on the south shore (Figure 1). Recent commercial landings for stock assessment units 27, 28-32, and 33, are all high relative to the long-term means (Figure 2). For LFA 33 in particular, recent landings are the highest on record.

Figure 1. Lobster Fishing Areas (LFAs) 27-33.

Canada

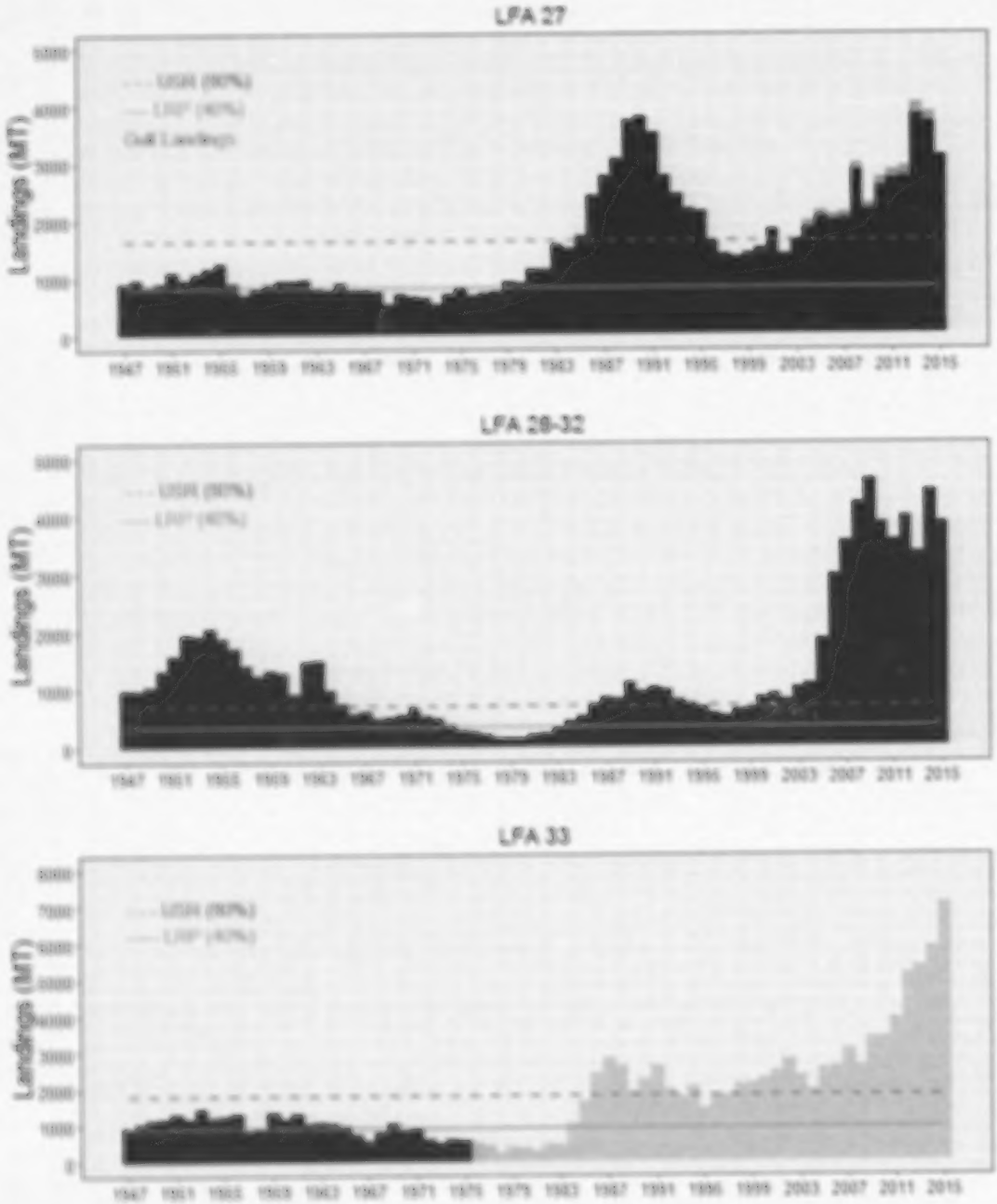

Figure 2. Annual lobster landings by the commercial fishery in LFAs 27, 28-32, and 33 from 1947 to 2015 (2014-2015 for LFA 33). Gulf landings are added to LFA 27(orange), are preliminary for 2014 and are not yet available for 2015. Reference points are shown as horizontal lines with the blue dashed line representing the upper stock reference (USR) and the green solid line the limit reference points (LRP). In LFA 33, landings shown in black are based on annual values, while landings in grey are seasonal values, with 2015 representing the season from November 2014 to May 2015.

Management measures (Table 1) include closed seasons, limits on the number of licenses, trap limits, minimum legal sizes (MLS) and protection of females with eggs (ovigerous or "berried"). There is a possession restriction of V-notched lobsters except in LFA 27 and LFA 31A.

Table 1. Numbers (No.) of licenses and management measures in LFAs 27-33 as of December 31, 2015.

LFA	Season	Total No. of Licenses	Trap Limit[1]	MLS[3] (mm)	Other Measures
27	May 15 - July 15	520[2]	275	82.5	not applicable
28	April 30 - June 30	14	250	84	Max. hoop size – 153 mm
29	April 30 - June 30	63	250	84	Max. hoop size – 153 mm
30	May 20 - July 20	20	250	82.5	Max. carapace length (CL) - 135 mm for females
31A	April 29 - June 30	72	250	82.5	Closed window,114-124 mm
31B	April 19 - June 20	71	250	82.5	V-notching and release of 110 lb of mature females/ licence
32	April 19 - June 20	159	250	82.5	V-notching, and release of 110 lb of mature females/ licence
33	Last Mon. Nov - May 31	698	250	82.5	not applicable

[1] *Trap limit is for category "A" licence holders only.*
[2] *Of which 481 are within Maritimes Region and 39 are within the Gulf Region.*
[3] *Minimum legal size (MLS) is measured in mm of Carapace Length (CL).*

There have been some significant changes in management measures in LFAs 27-33 since 1998. The largest change was an increase in the MLS in LFA 27 from 70 mm to 76 mm CL (1998-2002), from 76 mm to 81 mm CL (2007-2009) and from 81 mm to 82.5 mm in 2014. V-notching can occur in all LFAs, but only in LFA 27 and 31A can V-notched lobsters be legally retained (Tremblay et al. 2011).

Analysis and Response

Landings-based reference points are part of the current Inshore Lobster Integrated Fisheries Management Plan for LFAs 27-38. These were modified using an alternative reference time period (1985-2009 instead of 1985-2004) at a Maritimes Region Science Advisory Meeting in 2012, and it was recognized that using landings as the sole indicator of abundance for lobster stocks has risks (DFO 2012). At the framework and assessment for LFAs 27-33 in 2011 and 2012, respectively, commercial catch rate and catch rate of sublegals in standardized traps maintained by the Fishermen and Scientists Research Society (FSRS) were identified as key abundance indicators. However, reference points based on these indicators were not adopted and this will be revisited at the next framework meeting for LFAs 27-33, tentatively scheduled for fall 2017.

Landings

The Upper Stock Reference (USR) for the abundance of legal lobsters based on landings (Table 2) is defined as 80% of the median for the period 1985-2009. The metric for assessing where the stock is relative to the USR is the 3-year running mean of landings. For the season ending in 2015, this metric is above the USRs for all stock assessment units (LFAs 27, 28-32, and 33) and individual LFAs.

Table 2. Lobster landings[1] (mt) from 1998-2015, 3 year mean (2012-2014) and the USR based on the 1985-2009 landings. Year applies to LFA 27-32, and season applies to LFA 33.

Year	LFA 27	LFA 27G[2]	LFA 28	LFA 29	LFA 30	LFA 31A	LFA 31B	LFA 32	LFA 28-32	Season	LFA 33
1998	1347	na[3]	12	52	70	72	128	309	643	97-98	2103
1999	1425	na	5	50	70	78	139	316	658	98-99	2129
2000	1505	na	5	54	54	87	212	448	860	99-00	2243
2001	1820	na	5	66	98	100	204	433	906	00-01	2460
2002	1395	na	8	57	79	103	210	358	815	01-02	2764
2003	1659	na	13	125	73	152	279	389	1031	02-03	2320
2004	1850	115	8	190	84	213	305	289	1089	03-04	1955
2005	2036	117	9	402	112	426	498	403	1850	04-05	2519
2006	1966	118	11	658	187	672	825	602	2955	05-06	2556
2007	2024	110	9	792	216	827	1061	632	3537	06-07	3033
2008	2849	138	13	1076	413	962	1031	704	4199	07-08	2599
2009	2176	104	14	1088	452	956	1270	829	4609	08-09	3402
2010	2570	146	12	914	371	911	1001	657	3866	09-10	3377
2011	2691	149	7	727	383	757	925	758	3557	10-11	3905
2012	2751	161	11	729	416	807	1080	922	3965	11-12	5126
2013	3808	209	12	607	461	671	740	862	3353	12-13	5345
2014	3673	174	16	759	455	806	1148	1239	4423	13-14	5835
2015	3098	na	13	635	424	728	1036	1025	3861	14-15	7065
Mean 2012-14	**3411**	**181**	**13**	**698**	**444**	**761**	**989**	**1008**	**3914**		**5435**
USR[4]	**1629**		**120**		**79**	**250**		**242**	**688**		**1838**

1 Landing values were sourced as of Jan 29, 2016.

2 LFA 27G refers to Gulf landings. The 2014 value is preliminary, and the 2015 value is not yet available.

3 na = data not available

4 USR = Upper Stock Reference

Commercial Catch Rate

The catch-per-unit-effort of commercial sizes (CPUE, in kg/trap haul) for 2004-2015 from commercial logs and voluntary logs are shown for each LFA in Figure 3. The larger LFAs, 27 and 33, were further subdivided into north-south and east-west subareas to address spatial differences across these areas (Figure 1). In the past three years, CPUE in LFA 27 north and south were higher than those recorded for 2008-2012 and these areas also had the highest values from the voluntary logs. However, in LFA 27 north, catch rates have been declining over the past three years (Figure 3). For LFAs 28-32, CPUEs in 2015 were lower than 2014; however, in LFAs 28 and 32, the 2015 CPUEs were still above the long term means (2008-2014). CPUE in 2015 for LFAs 29 and 31A (Chedabucto Bay area) are below their long-term mean and down from the peak of 2009, but are still higher than pre-2005 voluntary log CPUE. CPUE in LFA 33 continues to be higher in the west than in the east, and both areas have increased continuously since 2008. In both areas of LFA 33, commercial CPUE in recent years is higher than the values recorded in voluntary log records going back to the mid-1980s (Figure 3).

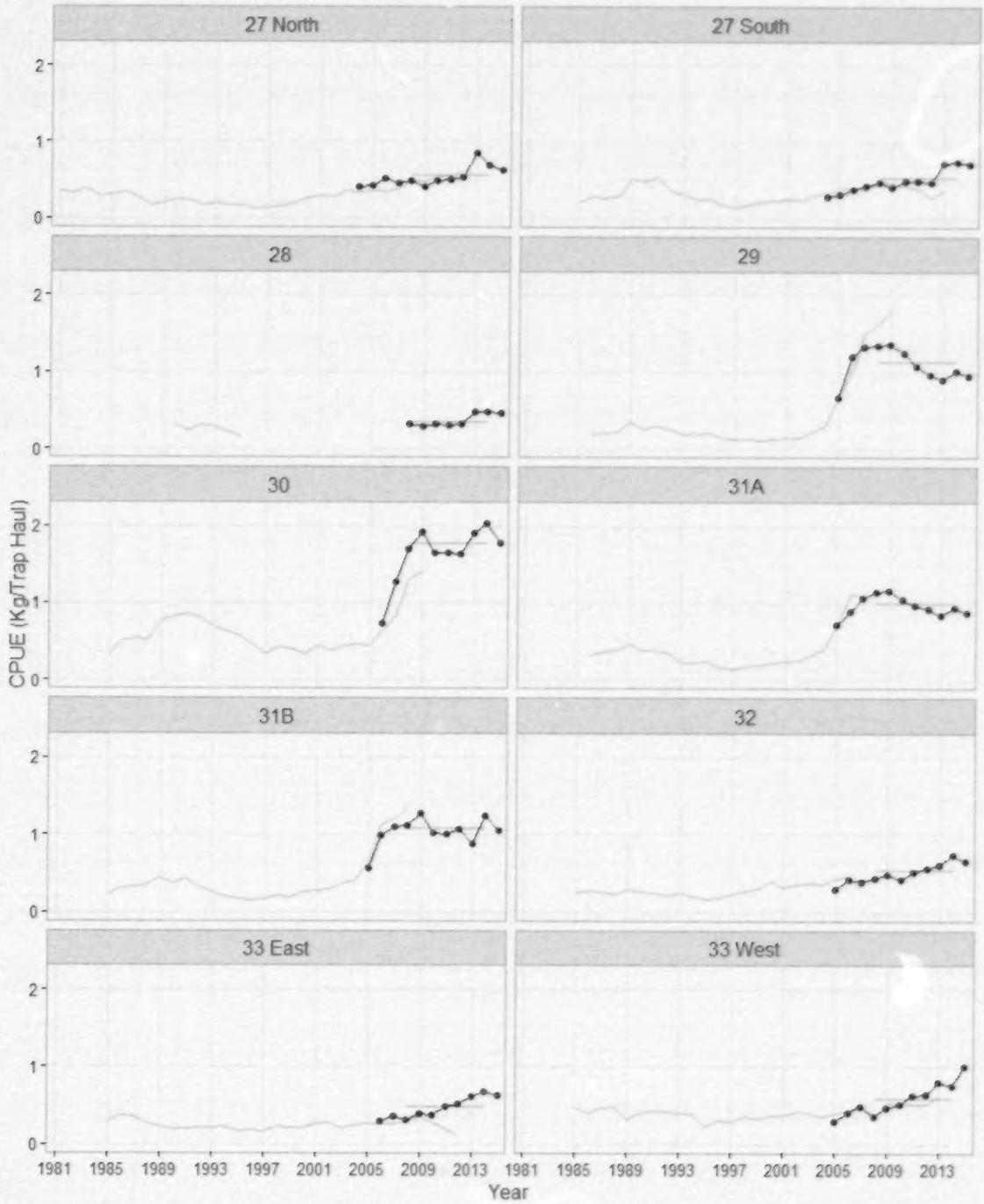

Figure 3. Trend in commercial CPUE (kg/trap haul) for available time period for LFAs 27-33. CPUE is calculated as total weight landed/total trap hauls for logs that provide complete landings and effort data. The red line represents voluntary log CPUE, the blue segment represents the long term mean for years 2008 to 2014 inclusive, and the black line represents mandatory logs.

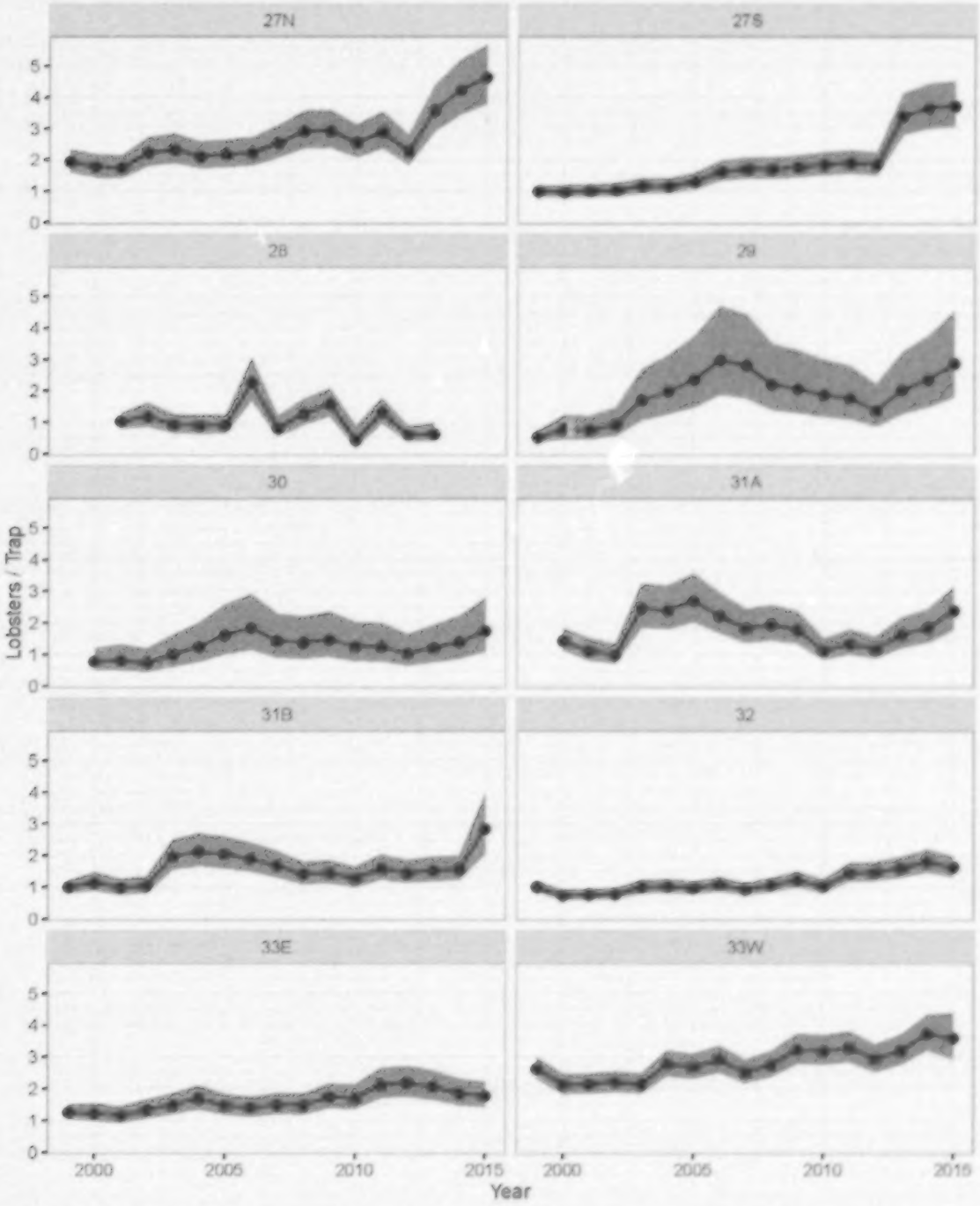

Figure 4. Trend in the catch rate of sublegal lobsters (total number/total trap hauls) for years where there are available data for LFAs 27-33. Trends are standardized using Generalized Linear Mixed Models of CPUE with 95% confidence intervals shown as the shaded polygon.

Catch Rate of Sublegals in Standardized Traps

The catch-per-unit-effort for sublegal sizes (CPUE, in number/trap haul) for 1999-2015 from FSRS standardized traps is shown in Figure 4. These are the results of a generalized linear mixed model (glmm) that accounts for the influence of temperature and the number of legal size lobsters on the number of sublegal size lobsters captured per trap haul. For LFA 27 north and south, there has been a substantial increase in the CPUE of sublegals from 1999-2015. Some of this increase is related to increases in minimum legal size, as lobsters that were previously legal are now sublegal but are still retained by FSRS traps.

For LFAs 29, 30, and 31A, sublegal catch rates have been increasing over the last three years. CPUE in LFA 31B peaked in 2015 to the highest level on record. LFA 28 varies without any discernable trend. Catch rates in LFA 32 and 33 east have been consistent over the past several years. In LFA 33 west, sublegal CPUE has gradually increased since the early 2000s and 2015 is similar to 2014.

Conclusions

At the end of the 2015 fishing season, the lobster stocks in LFAs 27, 28-32, and 33 were considered to be within the healthy zone. The 3-year running means (2012-2014) of landings for individual LFAs and for LFAs combined as stock units (LFAs 28-32) were all above the USRs. Catch rates of legal and sublegal lobsters remain high relative to historic levels providing support to the assertion that these stocks are in the healthy zone.

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Date: April 29, 2016

Sources of Information

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This Report is Available from the

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ISSN 1919-3769
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Correct Citation for this Publication:

DFO. 2016. Lobster (*Homarus americanus*) off the Atlantic Coast of Nova Scotia (Lobster Fishing Areas 27-33): 2016 Stock Status Update. DFO Can. Sci. Advis. Sec. Sci. Resp. 2016/025.

Aussi disponible en français :

MPO. 2016. Homard (Homarus americanus) au large de la côte atlantique de la Nouvelle-Écosse (zones de pêche du homard 27 à 33) : Mise à jour de l'état du stock de 2016. Secr. can. de consult. sci. du MPO, Rép. des Sci. 2016/025.